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On October 6, 2003

TOWNSEND and TOWNSEND and CREW LLP

By: Greg M. Marshall

PATENT
Attorney Docket No.: 02307Z-090130US
Client Ref. No.: 99-013-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Phillips, Donald A., *et al.*

Application No.: 09/831,958

Filed: October 15, 2001

For: NOVEL ENHANCERS OF PLANT GROWTH

Customer No.: 20350

Confirmation No.: 3597

Examiner: L.B. Lankford

Technology Center/Art Unit: 1651

DECLARATION OF DONALD A. PHILLIPS, CECILLIA M. JOSEPH, AND JAMES R. SANBORN

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Donald A. Phillips, Cecillia M. Joseph, and James R. Sanborn, declare as follows:

1. We are the co-inventors of claims 1-20 of the above-referenced patent application.

2. We conceived of and reduced to practice the claimed invention in the United States prior to September 11, 1997. Attached Exhibits A and B provide evidence of the conception of the invention and its reduction to practice. Figure 5 in Exhibit A, as well as Exhibit B (with dates redacted), were prepared prior to September 11, 1997. For the convenience of the Examiner, Exhibit C is provided to illustrate the structure of lumichrome.

3. The present invention relates, in part, to the discovery that application of lumichrome to a plant increases net photosynthesis, and therefore increases net growth of the plant. The identification of lumichrome resulted from the initial discovery that certain soil bacteria, including *Rhizobium meliloti*, induced increased photosynthesis in plants. Increased photosynthesis was measured indirectly by measuring root respiration. Photosynthesis-inducing compounds, including lumichrome, were subsequently purified from *Rhizobium meliloti*.

4. Exhibit A is a copy of Volpin and Phillips, *Plant Physiol.* 116:777-783 (1998), which displays in Figure 5 an exemplary result of HPLC purification of culture filtrates of *Rhizobium meliloti*. Figure 5 was created by the inventors before September 11, 1997. Indeed, the manuscript was received by the journal on August 18, 1997. Figure 5 of Exhibit A illustrates the peaks resulting from fractionating a microbial extract using an HPLC column. Some peaks representing different fractions from the column were labeled "A," "B," "C," and "D." As explained in Exhibit A, very small amounts of "peak D" were effective to increase net photosynthesis, as measured by root respiration. See, e.g., page 780, right column, first full paragraph.

5. Exhibit B is a table summarizing peaks from a NMR analysis of HPLC peak D. The table was generated before September 11, 1997. The NMR spectrum demonstrates that peak D contained lumichrome. Specifically, eight of the ten protons in lumichrome can be

seen in the NMR spectrum. For example, the C7 and C8 protons (six in total) of lumichrome are represented at 2.543 and 2.522 ppm, respectively. Protons at C6 and C9 of lumichrome are displayed as peaks at 7.754 and 7.945 ppm, respectively.

6. Exhibit C provides the structure of lumichrome and labels the C6, C7, C8 and C9 positions for the convenience of the Examiner.

7. The data described in Exhibits A and B demonstrate that we applied an agent (peak D) comprising lumichrome to a plant and detected an increase in net photosynthesis prior to September 11, 1997. In view of the foregoing, we respectfully submit that Exhibits A and B establishes that the claimed invention was conceived and reduced to practice prior to September 11, 1997.

We further declare that all statements made herein of our knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that any such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed: Donald A. Phillips
Donald A. Phillips

Dated: September 24, 2003

Signed: Cecilia M. Joseph
Cecilia M. Joseph

Dated: Sept. 25, 2003

Signed: James R. Sanborn
James R. Sanborn

Dated: September 24, 2003